DECLARATION

I, HWANG, Hyo-jung translator, working at Leaders Bldg. 3F, 1599-11 Seocho-dong, Seocho-gu, Seoul 137-070, Republic of Korea, do hereby declare that I am familiar with the English language as a Korean and that the attached is a true English translation of the Korean transcript of Korean Patent Application No. **10-2003-0039679** filed with the Korean Intellectual Property Office on **June 19, 2003**

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ABSTRACT OF DISCLOSURE

A linear compressor comprises an external casing forming a compressing chamber; an outer core disposed in the external casing; an inner core assembly disposed inside of the outer core interacting with the outer core; and wherein the inner core assembly comprises an inner core, an upper cover combined to an upper part of the inner core, and a bottom supporting part combined to a bottom part of the inner core. With this configuration, the linear compressor provides a capability of simplifying an inner core assembly, thereby reducing the manufacturing cost.

REPRESENTATIVE DRAWING

FIGURE 1

LINEAR COMPRESSOR

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of a linear compressor according to a first embodiment of the present invention.

FIG. 2 is a plan view of an inner core assembly of the linear compressor shown in FIG. 1.

FIG. 3 a sectional view of the inner core assembly, taken along a line III-III in FIG. 2.

FIG. 4 is a plan view of the inner core assembly shown in FIG. 2, with an upper cover eliminated.

FIG. 5 is a plan view of the inner core assembly according to a second embodiment of the present invention.

FIG. 6 is a sectional view of an inner core assembly, taken along a line VI-VI in FIG. 5.

FIG. 7 is a plan view of an inner core assembly according to a third embodiment of the present invention.

FIG. 8 is a sectional view of the inner core assembly, taken along a line VIII-VIII in FIG. 7.

<Reference numerals of elements>

10: external casing	20: mover
22: main frame	22a: core supporting frame
30: compressing part	36: piston
40: outer core	42: coil
44: supporting block	50: resonant spring

52: shaft member 60: inner core assembly

70: upper cover 80: bottom supporting part

BACKGROUND OF THE INVENTION

The present invention relates to a linear compressor, and in more detail, the linear compressor with having an improved assembling structure of an inner core assembly.

In general, a conventional linear compressor comprises a casing, a mover provided in the casing and reciprocating by an interaction of an inner core and an outer core, a compressing part compressing a refrigerant and discharging it, and a linear motor generating a driving force the inner and outer cores.

With this configuration, the conventional linear compressor operates in the following sequence.

When power is supplied to the compressor while the compressor is in a stop state, current is applied to winding coils at an opening part of the outer core by the supplied power, thereby generating a rotational magnetic flux at the inner core and the outer core. The magnetic flux interacts with a magnetic field formed by a magnet so as to reciprocate a piston, and thereby suctioning the refrigerant and sending it out after compressing.

Korean Patent No. 0374837 discloses a linear motor for such a conventional compressor, which comprises a stator

having an outer core and an inner of a cylinder shape inserted into the outer core; winding coils combined into the inner core or the outer core; and a mover movably inserted between the outer core and the inner core with having a permanent magnet provided.

The outer core as a part of the stator has a plurality of lamination sheets incorporated into a laminated unit, and is combined to an annular bobbin having coils wounded by an injection-moulded insulator.

However, it is required that the inner core and the outer core provided as a laminated unit can be more firmly mounted with a simple structure and an easy installation, and thereby reducing a cost for manufacturing the conventional linear motor.

Also, it is preferable to prevent the loss of efficiency of the linear motor due to an eddy current loss generated when material having low electrical resistivity for inner core of the conventional linear motor.

ASPECT OF THE INVENTION

Accordingly, it is an aspect of the present invention to provide a linear compressor which is capable of simplifying an inner core assembly, thereby increasing the productivity and reducing the manufacturing cost.

CONFIGURATION OF THE INVENTION

The forgoing and other aspects of the present invention are achieved by providing a linear compressor comprising an external casing forming a compressing chamber; an outer core disposed in the external casing; an inner core assembly disposed inside of the outer core interacting with the outer core; and wherein the inner core assembly comprises an inner core, an upper cover combined to an upper part of the inner core, and a bottom supporting part combined to a bottom part of the inner core.

According to an aspect of the invention, the inner core comprises a plurality of core blocks provided by stacking a plurality of core steel plates made by punching thin steel plates, and the plurality of core blocks are circumferentially arranged around the inner core at regular intervals.

According to an aspect of the invention, each core steel plate has an upper hook in an upper part thereof, and a bottom hook in a bottom part, and the upper cover has an upper recess to cooperate with the upper hook and the bottom supporting part has a bottom recess to be engaged to the bottom hook.

According to an aspect of the invention, the upper cover and the bottom supporting part are connected each other by a connection member, which stands erect toward the

bottom supporting part.

According to an aspect of the invention, the connection member includes either a bolt or a rivet disposed between the plurality of core blocks.

According to an aspect of the invention, the upper cover and the bottom supporting part are provided as a single body, and the plurality of core blocks have connection supporting parts standing erect toward the bottom supporting part between the core blocks, forming a single body with the upper cover and the bottom supporting part.

According to an aspect of the invention, the inner core is made by stacking a plurality of core steel plates made by punching thin steel plates.

According to an aspect of the invention, the upper part of each of the core steel plates has an upper hook protruding upward, and the bottom supporting part of each of the core steel plates has a bottom hook protruding downward, and the upper cover has an upper recess to cooperate with the upper hook and the bottom supporting part has a bottom recess to cooperate with the bottom hook, and wherein an area where the upper hook is cooperated with the upper recess, and an area where the bottom hook is cooperated with the bottom recess are combined each other by welding.

Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

As shown in FIG. 1, a linear compressor according to a first embodiment of the present invention comprises an external casing 10, a mover 20 provided in the external casing 10 and reciprocating by an interaction of an outer core 40 (to be described later) and an inner core 61 (to be described later), and a compressing part 30 suctioning a refrigerant and sending it out after compressing.

The external casing 10 is closed to the outside with an upper casing part 11 and a bottom casing part 12 combined by being welded each other at an end part of the upper casing part 11 and an end part of the bottom casing part 12 together. In the linear compressor as shown in FIG. 1, the end part of the bottom casing part 12 is welded on the end part of the upper part 11.

The mover 20 comprises a main frame 22, an inner core assembly 60 disposed to the outer circumference of the main frame 22, and a magnet 26 disposed in the center of the opening part of the inner core assembly 60 in a shape of cylinder. An inner core 61 of the inner core assembly 60 is

radially disposed to the outer circumference of the main frame 22.

As illustrated in FIG. 2 through FIG. 4, the inner core assembly 60 has the cylinder-shaped inner core 61, an upper cover 70 combined to an upper side of the inner core 61, a bottom supporting part 80 combined to a bottom part of the inner core 61. The upper cover 70 is combined with the bottom supporting part 80 by a connection member 90. The inner core 61 has a plurality of core blocks 62 radially arranged at regular intervals to form a cylinder shape. Each of the core blocks 62 is formed by stacking plural core steel plates 63 made by punching a thin steel plate and welding the stack of core steel plates 63.

In upper parts of the plural core steel plates 63 forming the core block 62, upper hooks 64 are protruded upward to be combined to the upper cover 70, and bottom hooks 65 are protruded downward to be combined to the bottom supporting part 80 in bottom parts of the plural core steel plates 63.

An upper recess 71 is formed in the upper part of the inner core 61 to cooperate with the upper hook 64, so that the upper cover 70 is combined to the upper part of the inner core 61. Thus, the upper cover 70 can support the upper part of the inner core 61 as a result of the combination of the upper hook 64 and the upper recess 71.

In the upper cover 70, a plurality of first connecting holes 72 are circumferentially arranged around the inner core 61.

A bottom recess 81 is formed in a bottom part of the inner core 61 to cooperate with the bottom hook 65 and thereby the bottom supporting part 80 is combined to the bottom part of the inner core 61, so that the bottom supporting part 80 can support the bottom part of the inner core 61 as a result of the combination of the bottom hook 65 and the bottom recess 81.

In the bottom supporting part 80, a plurality of second combining holes 82 are circumferentially arranged around the inner core 61 with which the connection member 90 combining the upper cover 70 and the bottom supporting part 80 is to be engaged.

The connection member 90 may include a bolt or a rivet, and passes through the first connecting hole 72 of the upper cover 70 and passes through a space formed between the plural core blocks 62, and then inserts into the second connecting hole 82 of the bottom supporting part 80. Thus, the upper cover 70 and the bottom supporting part 80 are stably connected. Here, the connection member 90 is vertically placed to the bottom supporting part 80.

The compressing part 30 comprises a cylinder block 34 forming a compressing chamber while supporting a bottom

part of the outer core 40; a piston 36 reciprocating in the compressing chamber 32; and a cylinder head 38 provided in a bottom area of the cylinder block 34 and having various valves for a refrigerant.

The outer core 40, of a cylinder shape, is provided outside the mover 20, with a predetermined gap relative to the magnet 26. An opening part of the outer core 40 having a plurality of core steel plates 63 stacked each other has annular coils 42 therein.

The outer core 40 has its bottom part supported by the cylinder block 34 and its upper part supported by a supporting block 44. On an upper part of the supporting block 44, a resonant spring 50 accelerating the reciprocating movement of the piston 36 is combined by a plurality of shaft members 52.

With such a configuration, the linear compressor according to the present invention is operated as follows.

When power is supplied to the linear compressor in a stop state, current is applied to the coils 42 in the opening part 40a of the outer core 40. Then, a rotational magnetic flux is generated in the outer core 40 and the inner core 61 to thereby generate magnetic flux to interact with a magnetic field of the magnet 26. Thus the piston reciprocates up and down so as to suction, compress and discharge the refrigerant of the compressing chamber 32.

According to the first embodiment of the present invention, the upper cover 70 and the bottom supporting part 80 are individually provided and connected each other by the connection member 90, but according to a second embodiment as shown in FIG. 5 and FIG. 6, the upper cover 70 and the bottom supporting part 80 can be provided as a single unit by injection molding of resin or die casting of aluminum. Accordingly, unlike the connection member 90 provided between the plurality of the core blocks 62a according to the first embodiment of the present invention, connection supporting parts 95 are provided between the plurality of the core blocks 62a in a vertical direction to a bottom supporting part 80a as shown in FIG. 5, forming a single body with an upper cover 70a and the bottom supporting part 80a.

The inner core 61a comprises the plurality of core blocks 62 and 62a according to the first and the second embodiments of the present invention, but an inner core 61b can be made by radially stacking core steel plates 63a made by punching thin steel plates with an upper cover 70b combined to an upper part of the inner core 61b and a bottom supporting part 80b, being combined to a bottom part thereof. That is, as parts of the inner core 61b, an upper hook 64b formed in the plural core steel plates 63a and an upper recess 71b of the upper cover 70b are engaged each

other, and thus the upper cover 70b is connected to the upper part of the inner core 61b, and a bottom hook 65b formed in a plurality of the core steel plates 63b and a bottom recess 81b are engaged each other, so that the bottom supporting part 80b is connected to the bottom part of the inner core 61b.

According to a third embodiment of the present invention, connecting areas of the upper hook 64b and the upper recess 71b and of the bottom hook 65b and the bottom recess 81b are respectively welded, unlike the first and second embodiments.

With this configuration, in the linear compressor according to the present invention, the inner core assembly can be manufactured simply, thereby decreasing the manufacturing cost.

Also, the inner core assembly with such an assembling structure minimizes eddy current, thereby increasing the efficiency of the linear motor.

EFFECT OF THE PRESENT INVENTION

With this configuration, the linear compressor provides a capability of simplifying an inner core assembly, thereby reducing the manufacturing cost.

WHAT IS CLAIMED IS:

1. A linear compressor comprising:

an external casing forming a compressing chamber;

an outer core disposed in the external casing;

an inner core assembly disposed inside of the outer core interacting with the outer core; and

wherein the inner core assembly comprises an inner core, an upper cover combined to an upper part of the inner core, and a bottom supporting part combined to a bottom part of the inner core.

2. The linear compressor according to claim 1, wherein the inner core comprise a plurality of core blocks provided by stacking a plurality of core steel plates made by punching thin steel plates, and the plurality of core blocks are circumferentially arranged around the inner core at regular intervals.

3. The linear compressor according to claim 2, wherein each core steel plate has an upper hook in an upper part thereof, and a bottom hook in a bottom part, and the upper cover has an upper recess to cooperate with the upper hook and the bottom supporting part has a bottom recess to be engaged to the bottom hook.

4. The linear compressor according to claim 3, wherein the upper cover and the bottom supporting part are connected each other by a connection member, which stands

erect toward the bottom supporting part.

5. The linear compressor according to claim 4, wherein the connection member includes either a bolt or a rivet disposed between the plurality of core blocks.

6. The linear compressor according to claim 3, wherein the upper cover and the bottom supporting part are provided as a single body, and the plurality of core blocks have connection supporting parts standing erect toward the bottom supporting part between the core blocks, forming a single body with the upper cover and the bottom supporting part.

7. The linear compressor according to claim 1, wherein the inner core is made by disposing a plurality of core steel plates radially made by punching thin steel plates.

8. The linear compressor according to claim 7, wherein the upper part of each of the core steel plates has an upper hook protruding upward, and the bottom supporting part of each of the core steel plates has a bottom hook protruding downward, and the upper cover has an upper recess to cooperate with the upper hook and the bottom supporting part has a bottom recess to cooperate with the bottom hook, and wherein an area where the upper hook is cooperated with the upper recess, and an area where the bottom hook is cooperated with the bottom recess are combined each other by welding.

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FIG. 1

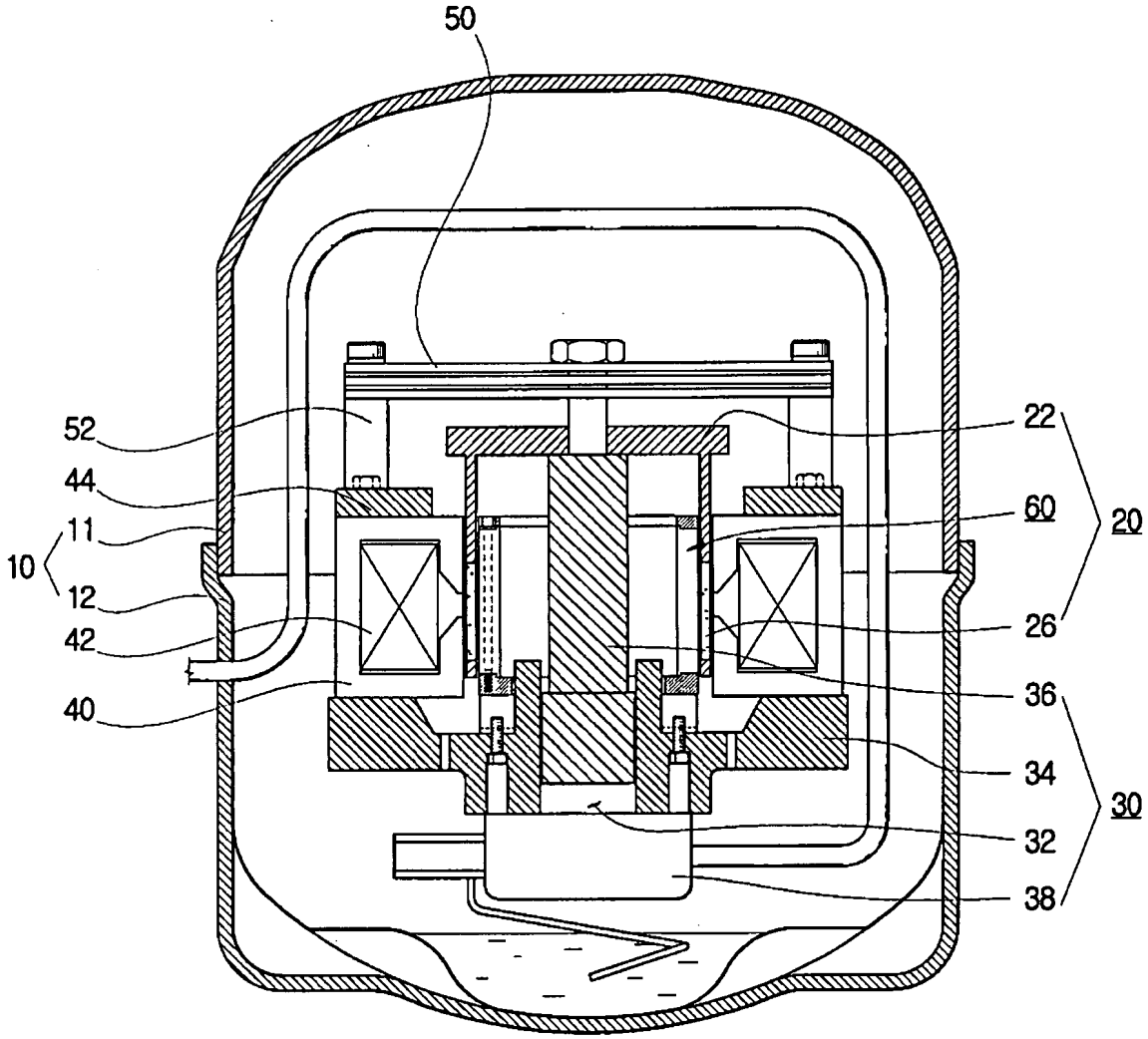

FIG. 2

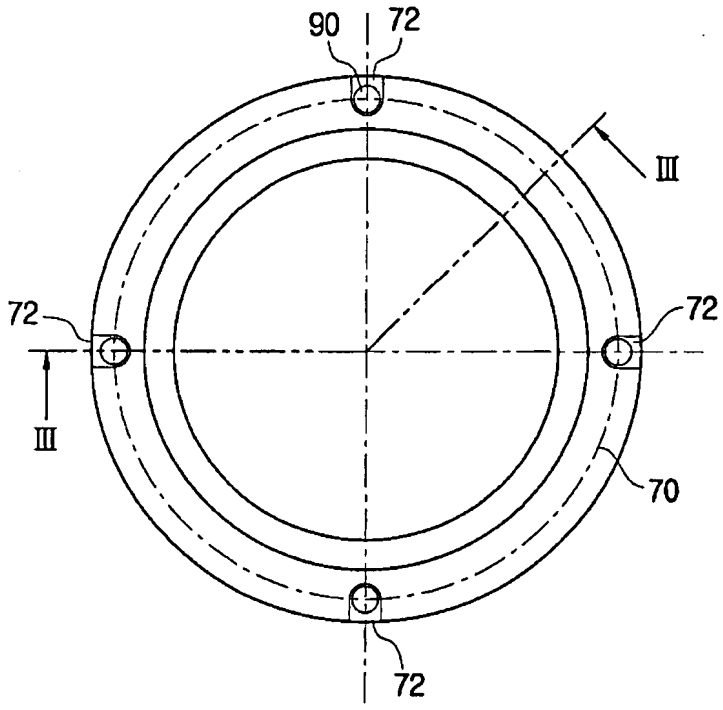

FIG. 3

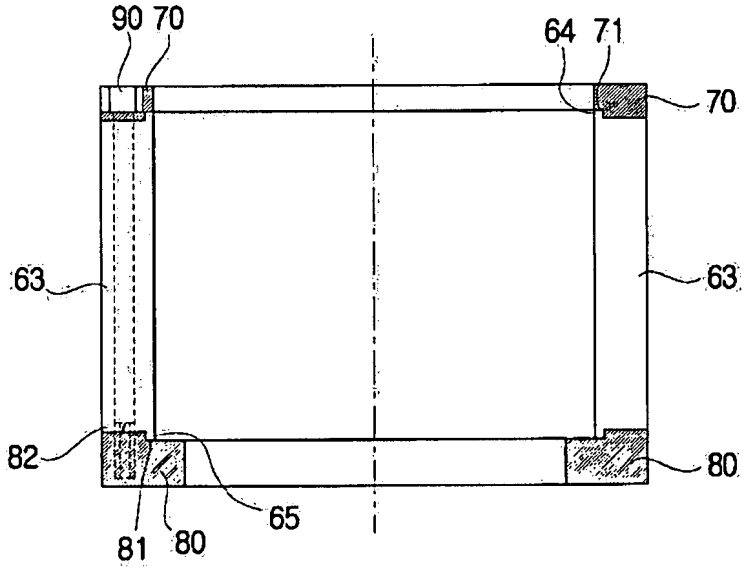

FIG. 4

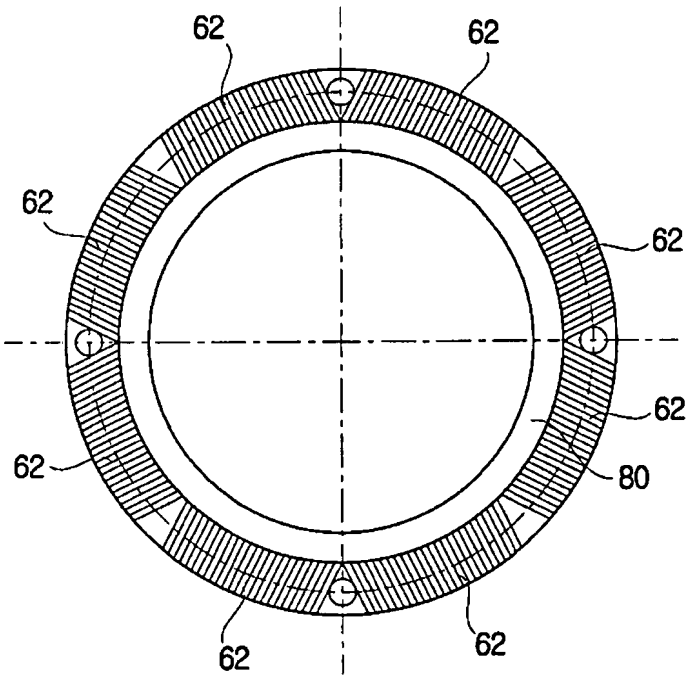

FIG. 5

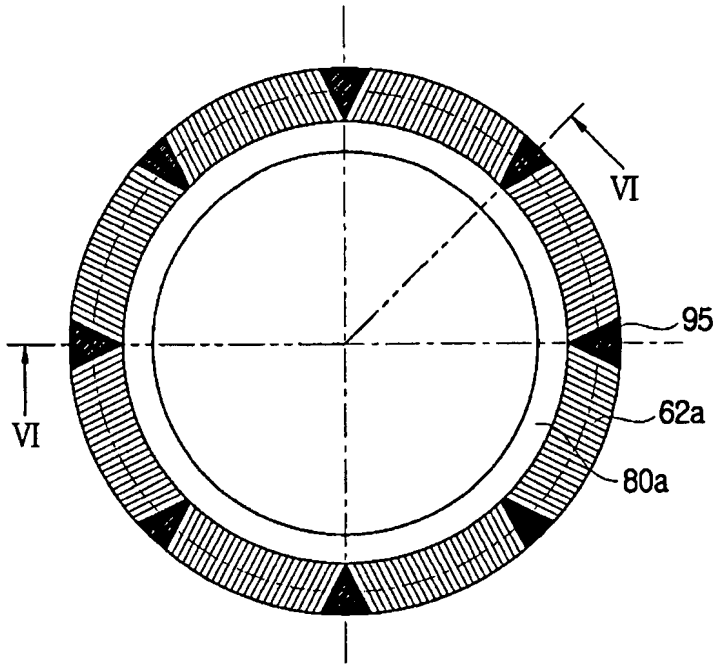

FIG. 6

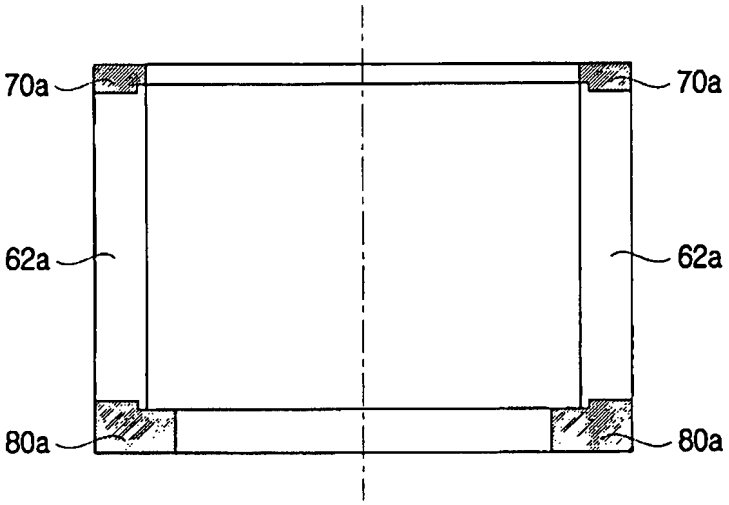

FIG. 7

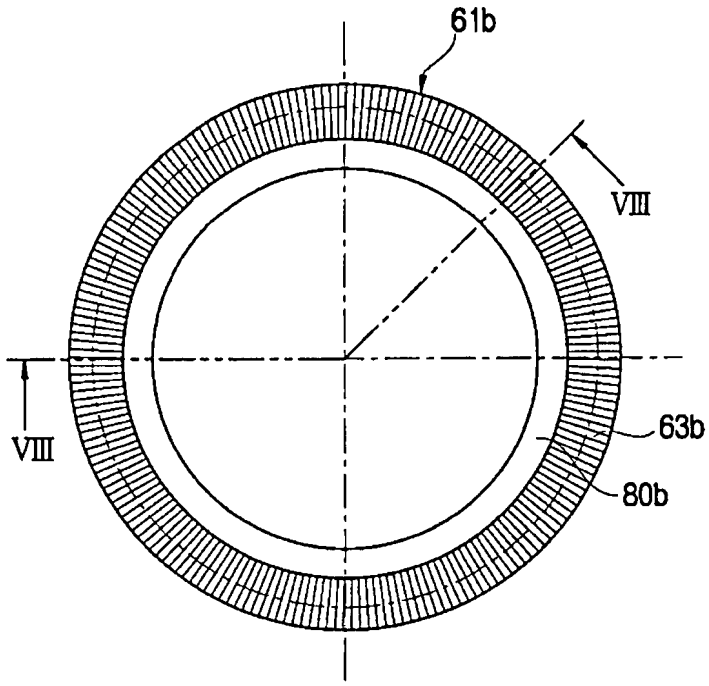

FIG. 8